

**STANDARD OF CARE  
FOR FIRE SPRINKLER SYSTEM DESIGN  
(Effective January 1, 2006)**

**COMMENTARY**

This standard of care is intended to be utilized only by engineers for the design of fire sprinkler systems. The standard is not intended for use by others as a code compliance checklist or to replace existing regulatory agency checklists. This standard was developed to assist in design and preparation of contract documents for fire sprinkler systems. This commentary and associated standard is the Board's policy regarding the responsibilities and interactions of an engineer with the design and construction team.

The Standard of Care for Fire Sprinkler Systems Design complements NFPA 13, Chapter 14, Appendix "A" (A-14.1 Preliminary Plans, 2002 edition), and should be interpreted only as a minimum standard of design. Just as the National Fire Protection Association standards are a minimum requirement, so is the Standard of Care for engineers. The engineer is required to evaluate local job conditions for the fire sprinkler system design and coordinate with authorities having jurisdiction (AHJ).

The Design Concept in the Standard of Care refers to those inputs and calculations initially done by the engineer to develop the conceptual ideas and limitations of the system (i.e. the density, water flow, and pressure requirements; classification of the commodities to be protected; and confirmation of the hydraulic data and preliminary hydraulic design). Initial design calculations will be included in the Design Concept. In a building with several different occupancies and fire loadings, only the area of highest demand needs to be calculated.

The engineer shall establish a margin of safety between the available water pressure and the required demand pressure. When sizing pipe using the initial design calculations, the engineer should leave more safety margin than the contractor. The difference is that the contractor's calculations will enumerate the various fittings and offsets that may not be delineated in the engineer's preliminary design.

A substantial deviation, such as a contractor's proposal for a major design change, should be recalculated and redrawn by the contractor's own Responsible Managing Employee (RME). The RME will certify his changes and submit for approval. If a competent sprinkler contractor submits a reasonable proposal for change, and if the contractor's drawings and calculations meet all the requirements of the engineer's design, and there is not a valid reason why the engineer has used a different layout configuration, the engineer should accept the contractor's drawings and calculations.

Field changes may not require recalculation by the engineer. Deviations in the field such as offsets around ductwork should be anticipated. Initial design calculations by the engineer containing a reasonable, practical pressure safety margin should cover these. Substantial deviations could require the contractor to prove his calculations are still adequate to provide the protection stipulated in the design documents.

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The shop drawings and calculations should be submitted to the engineer of record prior to transmittal to the reviewing authorities for documentation and approval. The engineer of record will document his review of the shop drawings and calculations, using a review stamp. This is an engineer's acceptance, acceptance as noted, rejection, or revise and resubmit, etc. of the shop drawings. This is based on review of the shop drawings against the design concept identified in the preliminary plans. The engineer should never place his P. E. seal on the sprinkler contractor's drawings or calculations unless he actually prepared them or supervised their preparation. The reviewing authorities may accept the sprinkler contractor's drawings and calculations even if different from the preliminary design submitted by the engineer, as long as they have been approved by the engineer of record.

The water supply information and flow testing addressed in the Standard of Care requires a flow test less than six months old. The engineer should supervise the performance of the flow test and/or will verify the accuracy of the test during preliminary design.

The engineer's drawings should clearly indicate the point that the licensed plumbing or site utilities contractor's work stops and the licensed fire sprinkler contractor's work begins. Note that the fire service piping is required to be installed and certified by a licensed fire sprinkler contractor. The point of service is defined in state law, including but not limited to, Tennessee Code Annotated, Title 62, Chapter 32 (Fire Sprinkler Contractors) and Rules Chapter 0780-2-7 -.01 (Definitions) of the Department of Commerce and Insurance. The drawings are to be prepared to assure continuity in materials and performance in accordance with the various codes, especially National Fire Protection Association, Standards 13 and 24.

### **STANDARD OF CARE**

#### **The Design Concept (Bid Package)**

- I. The Engineer develops the conceptual ideas and limitations of the system. Plans shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor, and shall show those items from the following lists that pertain to the design of the system:
  1. Size and location of all risers, mains, and branch lines as required to provide preliminary hydraulic calculations (See Commentary and Section III).
  2. Size, type (i.e. wet, dry, deluge, pre-action, etc.), and location of risers and standpipes with description and arrangement of valving and accessories, including location of any and all hose valves, alarms and signal devices. Include area protected by each riser, each system, and each floor.
  3. The location and size of the hydraulically most remote area.
  4. A description of Occupancy and Commodity classifications.
  5. Preliminary hydraulic calculation results including, required design density, area of application, required hose stream, and required duration.

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6. Clear statement on the required water supply margin of safety between the required water supply (including hose-streams) and the available supply. A suggested safety margin is a 5% difference between the system demand and the available water supply.
7. Type and finish of sprinkler heads in finished areas. Verify if specific sprinkler head location parameters exist.
8. Clear statement on any required seismic bracing. A statement to the effect of, "Install seismic bracing per NFPA 13" is *not* acceptable as NFPA 13 describes only how to install bracing.
9. Fire pump (if required) room layout, fire pump and controller specification, and transfer switch.
10. Standpipe design (if required) must be clearly delineated on the drawings.
11. A completed Owner's certificate. See NFPA 13, 2002 edition, Figure A.14.1(b) Owner's Information Certificate.

It is understood that, for many projects, a total design package prepared by a design team of various disciplines will be completed. These design documents may consist of multi-disciplinary drawings and specifications, and shall show:

12. Name of owner and occupant.
  13. Location, including street address.
  14. North arrow.
  15. Construction type, building height in feet, building area, and occupancy of each building.
  16. Full height cross section, or schematic diagram, including structural member information if required for clarity and including ceiling construction and method of protection for nonmetallic piping.
  17. Building features such as combustible concealed spaces, floor openings, window openings, areas subject to freezing, and areas from which it is intended to omit sprinkler protection.
  18. Location of fire barriers and their fire resistance rating.
  19. Proposed location and approximate size, if a water supply employing pumps or tanks is contemplated.
  20. Name and address of party submitting the preliminary plans.
  21. Tentative location of underground major piping, including mains, risers, overhead mains, and fire department connections.
- II. Site plans (may be combined with floor plans) contain information pertinent to the proper operation of suppression systems. Information below, with the appropriate details, is required:
1. Size and location of water supplies.
  2. Size and location of all piping indicating, where possible, the class and type of new pipe to be installed, and the depth to which it is to be buried.
  3. Size, type, and location of valves. Indicate if located in pit or if operation is by post indicator or key wrench through a curb box.
  4. Size, type, and location of meters and backflow prevention devices.
  5. Size, type, and location of hydrants. Include number and size of outlets. Indicate if hose houses and equipment are to be provided and by whom.

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6. Size and location of standpipe risers, hose outlets, monitor nozzles, and related equipment.
7. Location of Fire Department connections; if part of private fire service main system, including detail of connections.
8. Water supply information:
  - a. Information regarding whether the main is circulating or dead-end.
  - b. Pressures under flowing and static conditions. Information on orifice size and co-efficient of orifice used in the test, and pitot pressure.
  - c. Elevations of slabs, floors, ceilings, street main connection, test hydrant, etc.
  - d. Information on who conducted the flow test, when, and where the test was conducted. If reliable or current (less than six months old) information is not available, the engineer should supervise the performance of a new flow test and/or will verify the accuracy of a new flow test during preliminary design.
  - e. Water supplies and environmental conditions should be evaluated for the existence of microbes and conditions that contribute to Microbiologically Influenced Corrosion (MIC). Where conditions are found that contribute to MIC, the Owner(s) will be notified.

### III. Preliminary hydraulic calculations.

1. The Engineer shall prepare and submit preliminary hydraulic calculations proving availability of adequate water, (volume, duration, and pressure) for protection of the area of greatest demand.

### IV. Specifications

1. Specifications shall be prepared for fire protection the same as for any other portion of the project.

### V. Engineer's Seal

1. The engineer of record submitting fire protection system design construction documents shall seal, sign, and date each page or sheet of drawings and the first page of specifications and calculations.

### VI. Legend

1. The engineer's drawings should clearly indicate the point that the licensed plumbing or site utilities contractor's work stops and the licensed fire sprinkler contractor's work begins. Note that the fire service piping is required to be installed and certified by a licensed fire sprinkler contractor. The point of service is defined in state law, including but not limited to, Tennessee Code Annotated, Title 62, Chapter 32 (Fire Sprinkler Contractors) and Rules Chapter 0780-2-7-.01 (Definitions) of the Department of Commerce and Insurance.